

REMARKS

The indication by the Examiner that claims 19 and 20 are allowed, and that claims 8 and 9 contain allowable subject matter is acknowledged.

The preambles of the independent claims 1, 13, and 19 have been amended to clarify that the segmented labyrinth seal is not limited to use with bearing housings. A typographical error has also been corrected in independent claims 1 and 13. Now, rather than claiming that the first and second sides of the plurality of profiled teeth are slanted toward the first face, claims 1 and 13 have been amended to indicate that the first and second sides of the plurality of profiled teeth are slanted toward the second face as discussed on page 9, lines 7-10, of the specification. As such, this amendment to independent claims 1 and 13 properly reconciles the teachings of the specification and the interpretations of the claims by the Examiner with the claims.

The Examiner has indicated that the drawings "fail to comply with 37 C.F.R. § 1.84(d)(5) because they do not include the following reference signs mentioned in the description: 27." As seen in the specification on page 6, line 15, the numeral 27 refers to a clamping spring. However, at page 6, lines 13 and 14, the clamping spring had already been introduced as being "not shown". Therefore, inclusion of the numeral 27 in the specification was a typographical error, and the Applicant has removed its reference by amending page 6, line 15. Consequently, in light of this amendment to the specification, the objection to the drawings is now moot.

Turning now to the claim rejections under 35 U.S.C. § 103, the Examiner has rejected claims 1-7 and 10-18 as unpatentable over a combination of U.S. Patent Nos. 5,503,407 (hereinafter "McNickle"), 3,155,395 (hereinafter "Hoffman"), and 1,978,239 (hereinafter "Wheeler").

According to the Examiner, "McNickle discloses a labyrinth seal with a windback configuration comprising a first face 40, a second face 20, an exterior surface, and an interior surface with a thread pattern 22." Additionally, the Examiner indicates that "the thread pattern has plural teeth having first sides (toward 20), second sides (toward 40), and connecting sides that form trailing and leading edges (*i.e.*, teeth have a thickness and therefore have edges)." The

Examiner indicates that, although McNickle does not disclose the seal being segmented, "Hoffman teaches making the seal in two halves for easier installation," and, "therefore, it would have been obvious for one of ordinary skill in the art . . . to modify the seal of McNickle by making it segmented for easier installation as taught by Hoffman." Moreover, the Examiner indicates that, although "McNickle does not disclose that the first and second sides of the teeth are slanted toward the first face or that the first side has a steeper incline and angle than the second side," Wheeler "teaches a labyrinth seal having plural teeth" slanted toward the higher pressure angled such that the first side is steeper and has a greater angle than the second side. According to the Examiner, it therefore "would have been obvious to one of ordinary skill in the art . . . to slant the teeth toward the higher pressure and make the teeth sides such that the first side is steeper and has a greater angle than the second side."

The Applicant respectfully disagrees with the Examiner's position regarding claims 1-7 and 10-18. Unlike the instant invention which, as claimed in independent claims 1 and 13, is configured to allow a pressure drop to be taken thereover, the combination of McNickle, Hoffman, and Wheeler would be specifically configured to avoid such a pressure drop. That is the sealing devices disclosed in both McNickle and Hoffman are configured to avoid taking a pressure drop thereacross. For example, in the sealing device of McNickle, the windback assembly 14, is configured to prevent a pressure difference between the windback threads closer to the seal assembly 16 and the remainder of the sump 4. To that end, as discussed in column 5, lines 12-15 "one or more radial openings 70 have been made through windback assembly 14 at a position between the flange assembly 24 and the adjacent end of the thread 22." As seen in Figure 1, the radial opening(s) 70 equalize the pressure between the windback threads closer to the seal assembly 16 and the remainder of the sump 4. In other words, as discussed in column 5, lines 16-19 "with the provision of opening(s) 70, the pressure in the remainder of the sump 4 is maintained at the same level as the pressure between shaft 6 and thread 22 adjacent the seal assembly 16." Consequently, unlike the present invention which is configured to accommodate a pressure drop taken thereover, McNickle teaches that such a

pressure drop is undesirable, and that the sealing device (embodied in windback assembly 14) should be configured to equalize the pressures on either side thereof.

Additionally, Wheeler supports the teachings of McNickle, and requires pressure equalization on either side of a sealing device. For example, Wheeler discloses an elaborate design for multistage impact packing relying on a sealing device in the form of assembled helical sections 7, 9, 11, and 13 opposed to stuffing-box helical sections 14, 16, and 18. As seen in Fig. 1, the assembled helical sections 7, 9, 11, and 13 are provided on the shaft 2, and the stuffing-box helical sections 14, 16, and 18 are provided on the interior of the pump frame 1.

According to Col. 1, lines 1-8, of Wheeler, the multistage impact packing is used to retain liquid at high pressure in the pumping chamber. Supplementing the opposed assembled helical sections and stuffing-box helical sections, is the stuffing-box assembly contained in the main housing 4. The main housing 4 is interconnected with the pump frame 1, and the stuffing-box assembly is used to generate a back-pressure to effectively equalize the pressures on either side of its sealing device (the assembled helical sections and stuffing-box helical sections).

As discussed above, McNickle teaches that the radial opening(s) 70 must be provided to equalize the pressure on either side of its sealing device. As such, both McNickle and Wheeler teach that the pressures on either side of a sealing device must be equalized. Therefore, the teachings of McNickle and Wheeler support one another, and, resultantly, teach away from the instant invention. Consequently, neither McNickle, Wheeler, nor a combination of the references cited by the Examiner, provide for a labyrinth seal capable of accommodating a pressure drop thereover.

In conclusion, independent claims 1 and 13 (which provide the structure for accommodating the above-discussed pressure drop) are patentably distinct from the references cited by the Examiner. Therefore, independent claims 1 and 13 are allowable, and dependent claims 2-7 and 14-18, due to their respective dependency on allowable claims 1 and 13, are also allowable.

Should the Examiner wish to discuss any of the foregoing in more detail, the undersigned attorney would welcome a telephone call.

Respectfully submitted,

A handwritten signature in cursive script, reading "Edward G. Greive". The signature is written in dark ink and is positioned above a horizontal line.

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